

Instructor's Solutions Manual  
to accompany

# **INTRODUCTORY CIRCUIT ANALYSIS**

**Tenth Edition**

**Robert L. Boylestad**



Upper Saddle River, New Jersey  
Columbus, Ohio

---

**Copyright © 2003 by Pearson Education, Inc., Upper Saddle River, New Jersey 07458.** All rights reserved. Printed in the United States of America. This publication is protected by Copyright and permission should be obtained from the publisher prior to any prohibited reproduction, storage in a retrieval system, or transmission in any form or by any means, electronic, mechanical, photocopying, recording, or likewise. For information regarding permission(s), write to: Rights and Permissions Department.

Instructors of classes using Boylestad, *Introductory Circuit Analysis, Tenth Edition*, may reproduce material from the instructor's solutions manual for classroom use.

10 9 8 7 6 5 4 3 2 1



ISBN 0-13-048665-5

# Contents

---

CHAPTER 1 (Odd)	1
CHAPTER 1 (Even)	4
CHAPTER 2 (Odd)	8
CHAPTER 2 (Even)	11
CHAPTER 3 (Odd)	13
CHAPTER 3 (Even)	17
CHAPTER 4 (Odd)	21
CHAPTER 4 (Even)	24
CHAPTER 5 (Odd)	27
CHAPTER 5 (Even)	31
CHAPTER 6 (Odd)	35
CHAPTER 6 (Even)	41
CHAPTER 7 (Odd)	46
CHAPTER 7 (Even)	52
CHAPTER 8 (Odd)	58
CHAPTER 8 (Even)	67
CHAPTER 9 (Odd)	77
CHAPTER 9 (Even)	87
CHAPTER 10 (Odd)	99
CHAPTER 10 (Even)	108
CHAPTER 11 (Odd)	116
CHAPTER 11 (Even)	119
CHAPTER 12 (Odd)	123
CHAPTER 12 (Even)	130
CHAPTER 13 (Odd)	139
CHAPTER 13 (Even)	143
CHAPTER 14 (Odd)	146
CHAPTER 14 (Even)	152

CHAPTER 15 (Odd)	157
CHAPTER 15 (Even)	168
CHAPTER 16 (Odd)	181
CHAPTER 16 (Even)	184
CHAPTER 17 (Odd)	188
CHAPTER 17 (Even)	196
CHAPTER 18 (Odd)	207
CHAPTER 18 (Even)	221
CHAPTER 19 (Odd)	236
CHAPTER 19 (Even)	242
CHAPTER 20 (Odd)	248
CHAPTER 20 (Even)	256
CHAPTER 21 (Odd)	263
CHAPTER 21 (Even)	267
CHAPTER 22 (Odd)	270
CHAPTER 22 (Even)	278
CHAPTER 23 (Odd)	285
CHAPTER 23 (Even)	301
CHAPTER 24 (Odd)	316
CHAPTER 24 (Even)	320
CHAPTER 25 (Odd)	324
CHAPTER 25 (Even)	329
CHAPTER 26 (Odd)	334
CHAPTER 26 (Even)	340

# CHAPTER 1 (Odd)

5.  $12 \cancel{\text{mi}} \left[ \frac{15 \cancel{\text{min}}}{\cancel{\text{mi}}} \right] \left[ \frac{1 \text{ h}}{60 \cancel{\text{min}}} \right] = 3 \text{ h}$

7. CGS

9. MKS, CGS:  $^{\circ}\text{C} = \frac{5}{9}(^{\circ}\text{F} - 32) = \frac{5}{9}(68 - 32) = \frac{5}{9}(36) = 20^{\circ}$   
 K:  $\text{K} = 273.15 + ^{\circ}\text{C} = 273.15 + 20 = 293.15$

11.  $0.5 \cancel{\text{yd}} \left[ \frac{3 \cancel{\text{ft}}}{1 \cancel{\text{yd}}} \right] \left[ \frac{12 \cancel{\text{in}}}{1 \cancel{\text{ft}}} \right] \left[ \frac{2.54 \text{ cm}}{1 \cancel{\text{in}}} \right] = 45.72 \text{ cm}$

13. a.  $15 \times 10^3$                       b.  $30 \times 10^{-3}$                       c.  $7.4 \times 10^6$   
       d.  $6.8 \times 10^{-6}$                       e.  $402 \times 10^{-6}$                       f.  $200 \times 10^{-12}$

15. a.  $(10^2)(10^2) = 10^4$                       b.  $(10^{-2})(10^3) = 10$                       c.  $10^9$   
       d.  $(10^3)(10^{-5}) = 10^{-2}$                       e.  $(10^{-6})(10 \times 10^6) = 10$                       f.  $(10^4)(10^{-8})(10^{35}) = 10^{31}$

17. a.  $\frac{10^2}{10^3} = 10^{-1}$                       b.  $\frac{10^{-2}}{10^2} = 10^{-4}$                       c.  $\frac{10^4}{10^{-5}} = 10^9$   
       d.  $\frac{10^{-7}}{10^2} = 10^{-9}$                       e.  $\frac{10^{38}}{10^{-4}} = 10^{42}$                       f.  $\frac{(10^2)^{1/2}}{10^{-2}} = \frac{10^1}{10^{-2}} = 10^3$

19. a.  $(10^2)^3 = 10^6$                       b.  $(10^{-4})^{1/2} = 10^{-2}$   
       c.  $(10^4)^8 = 10^{32}$                       d.  $(10^{-7})^9 = 10^{-63}$

21. a.  $(-10^{-3})^2 = 10^{-6}$                       b.  $\frac{(10^2)(10^{-4})}{10} = \frac{10^{-2}}{10} = 10^{-3}$

c.  $\frac{(10^{-3})^2(10^2)}{10^4} = \frac{(10^{-6})(10^2)}{10^4} = \frac{10^{-4}}{10^4} = 10^{-8}$                       d.  $\frac{(10^2)(10^4)}{10^{-3}} = \frac{10^6}{10^{-3}} = 10^9$

e.  $\frac{(10^{-4})^3(10^2)}{10^6} = \frac{(10^{-12})(10^2)}{10^6} = \frac{10^{-10}}{10^6} = 10^{-16}$

f.  $\frac{[(10^2)(10^{-2})]^{-3}}{[(10^2)^2][10^{-3}]} = \frac{1}{(10^4)(10^{-3})} = \frac{1}{10} = 10^{-1}$

$$23. \quad \text{a.} \quad 6 \times 10^3 = \underset{-3}{\overbrace{0.006}^{+3}} \times 10^{+6} \qquad \text{b.} \quad 4 \times 10^{-4} = \underset{+3}{\overbrace{400}^{-3}} \times 10^{-6}$$

$$\text{c.} \quad 50 \times 10^5 = \underset{+2}{\overbrace{5000}^{-2}} \times 10^3 = \underset{-3}{\overbrace{5}^{+3}} \times 10^6 = \underset{-3}{\overbrace{0.005}^{+3}} \times 10^9$$

$$\text{d.} \quad 30 \times 10^{-8} = \underset{-5}{\overbrace{0.0003}^{+5}} \times 10^{-3} = \underset{+3}{\overbrace{0.3}^{-3}} \times 10^{-6} = \underset{+3}{\overbrace{300}^{-3}} \times 10^{-9}$$

$$25. \quad \text{a.} \quad 1.5 \cancel{\text{min}} \left[ \frac{60 \text{ s}}{1 \cancel{\text{min}}} \right] = 90 \text{ s} \qquad \text{b.} \quad 0.04 \cancel{\text{h}} \left[ \frac{60 \cancel{\text{min}}}{1 \cancel{\text{h}}} \right] \left[ \frac{60 \text{ s}}{1 \cancel{\text{min}}} \right] = 144 \text{ s}$$

$$\text{c.} \quad 0.05 \cancel{\text{s}} \left[ \frac{1 \mu\text{s}}{10^{-6} \cancel{\text{s}}} \right] = 0.05 \times 10^6 \mu\text{s} = 50 \times 10^3 \mu\text{s}$$

$$\text{d.} \quad 0.16 \cancel{\text{m}} \left[ \frac{1 \text{ mm}}{10^{-3} \cancel{\text{m}}} \right] = 0.16 \times 10^3 \text{ mm} = 160 \text{ mm}$$

$$\text{e.} \quad 1.2 \times 10^{-7} \cancel{\text{s}} \left[ \frac{1 \text{ ns}}{10^{-9} \cancel{\text{s}}} \right] = 1.2 \times 10^2 \text{ ns} = 120 \text{ ns}$$

$$\text{f.} \quad 3.62 \times 10^6 \cancel{\text{s}} \left[ \frac{1 \cancel{\text{min}}}{60 \cancel{\text{s}}} \right] \left[ \frac{1 \cancel{\text{h}}}{60 \cancel{\text{min}}} \right] \left[ \frac{1 \text{ day}}{24 \cancel{\text{h}}} \right] = 41.898 \text{ days}$$

$$\text{g.} \quad 1020 \cancel{\text{mm}} \left[ \frac{10^{-3} \text{ m}}{1 \cancel{\text{mm}}} \right] = 1.02 \text{ m}$$

$$27. \quad \text{a.} \quad 100 \cancel{\text{in.}} \left[ \frac{1 \text{ m}}{39.37 \cancel{\text{in.}}} \right] = 2.54 \text{ m} \qquad \text{b.} \quad 4 \cancel{\text{ft}} \left[ \frac{12 \cancel{\text{in.}}}{1 \cancel{\text{ft}}} \right] \left[ \frac{1 \text{ m}}{39.37 \cancel{\text{in.}}} \right] = 1.219 \text{ m}$$

$$\text{c.} \quad 6 \cancel{\text{lb}} \left[ \frac{4.45 \text{ N}}{1 \cancel{\text{lb}}} \right] = 26.7 \text{ N}$$

$$\text{d.} \quad 60 \times 10^3 \cancel{\text{dynes}} \left[ \frac{1 \cancel{\text{N}}}{10^5 \cancel{\text{dynes}}} \right] \left[ \frac{1 \text{ lb}}{4.45 \cancel{\text{N}}} \right] = 0.1348 \text{ lb}$$

$$\text{e.} \quad 150,000 \cancel{\text{cm}} \left[ \frac{1 \cancel{\text{in.}}}{2.54 \cancel{\text{cm}}} \right] \left[ \frac{1 \text{ ft}}{12 \cancel{\text{in.}}} \right] = 4921.26 \text{ ft}$$

- f.  $0.002 \cancel{\text{mi}} \left[ \frac{5280 \cancel{\text{ft}}}{1 \cancel{\text{mi}}} \right] \left[ \frac{12 \cancel{\text{in}}}{1 \cancel{\text{ft}}} \right] \left[ \frac{1 \text{ m}}{39.37 \cancel{\text{in}}} \right] = 3.2187 \text{ m}$
- g.  $7800 \cancel{\text{mi}} \left[ \frac{39.37 \cancel{\text{in}}}{1 \cancel{\text{mi}}} \right] \left[ \frac{1 \cancel{\text{ft}}}{12 \cancel{\text{in}}} \right] \left[ \frac{1 \text{ yd}}{3 \cancel{\text{ft}}} \right] = 8530.17 \text{ yds}$
29.  $299,792,458 \frac{\cancel{\text{mi}}}{\cancel{\text{s}}} \left[ \frac{39.37 \cancel{\text{in}}}{1 \cancel{\text{mi}}} \right] \left[ \frac{1 \cancel{\text{ft}}}{12 \cancel{\text{in}}} \right] \left[ \frac{1 \text{ mi}}{5280 \cancel{\text{ft}}} \right] \left[ \frac{60 \cancel{\text{s}}}{1 \cancel{\text{min}}} \right] \left[ \frac{60 \cancel{\text{min}}}{1 \text{ h}} \right]$   
 $= 670,615,288.1 \text{ mph} \approx 670.62 \times 10^6 \text{ mph}$
31.  $100 \cancel{\text{yds}} \left[ \frac{3 \cancel{\text{ft}}}{1 \cancel{\text{yd}}} \right] \left[ \frac{1 \text{ mi}}{5280 \cancel{\text{ft}}} \right] = 0.0568 \text{ mi}$   
 $t = \frac{d}{v} = \frac{0.0568 \cancel{\text{mi}}}{\frac{100 \cancel{\text{mi}}}{\text{h}}} = 0.0568 \times 10^{-2} \cancel{\text{h}} \left[ \frac{60 \cancel{\text{min}}}{1 \cancel{\text{h}}} \right] \left[ \frac{60 \text{ s}}{1 \cancel{\text{min}}} \right] = 2.045 \text{ s}$
33.  $\frac{50 \cancel{\text{mi}}}{\cancel{\text{min}}} \left[ \frac{60 \cancel{\text{min}}}{1 \text{ h}} \right] \left[ \frac{39.37 \cancel{\text{in}}}{1 \cancel{\text{mi}}} \right] \left[ \frac{1 \cancel{\text{ft}}}{12 \cancel{\text{in}}} \right] \left[ \frac{1 \text{ mi}}{5280 \cancel{\text{ft}}} \right] = 1.86 \text{ mi/h}$   
 $t = \frac{d}{v} = \frac{3000 \cancel{\text{mi}}}{1.86 \frac{\cancel{\text{mi}}}{\text{h}}} = 1612.9 \text{ h} = 67.2 \text{ days}$
35.  $100 \cancel{\text{yds}} \left[ \frac{3 \cancel{\text{ft}}}{1 \cancel{\text{yd}}} \right] \left[ \frac{12 \text{ in.}}{1 \cancel{\text{ft}}} \right] = 3600 \text{ in.} \Rightarrow 3600 \text{ quarters} = \$900$
37.  $d = vt = \left[ 600 \frac{\cancel{\text{cm}}}{\cancel{\text{s}}} \right] [0.016 \cancel{\text{h}}] \left[ \frac{60 \cancel{\text{min}}}{1 \cancel{\text{h}}} \right] \left[ \frac{60 \cancel{\text{s}}}{1 \cancel{\text{min}}} \right] \left[ \frac{1 \text{ m}}{100 \cancel{\text{cm}}} \right] = 345.6 \text{ m}$
39.  $d = (86 \cancel{\text{stories}}) \left( \frac{14 \text{ ft}}{\cancel{\text{story}}} \right) = 1204 \cancel{\text{ft}} \left[ \frac{1 \text{ mile}}{5,280 \cancel{\text{ft}}} \right] = 0.228 \text{ miles}$   
 $\frac{\text{min}}{\text{mile}} = \frac{10.7833 \text{ min}}{0.228 \text{ miles}} = 47.30 \text{ min/mile}$
41. a.  $5 \cancel{\text{J}} \left[ \frac{1 \text{ Btu}}{1054.35 \cancel{\text{J}}} \right] = 4.74 \times 10^{-3} \text{ Btu}$
- b.  $24 \cancel{\text{ounces}} \left[ \frac{1 \cancel{\text{gallon}}}{128 \cancel{\text{ounces}}} \right] \left[ \frac{1 \text{ m}^3}{264.172 \cancel{\text{gallons}}} \right] = 7.098 \times 10^{-4} \text{ m}^3$
- c.  $1.4 \cancel{\text{days}} \left[ \frac{86,400 \text{ s}}{1 \cancel{\text{day}}} \right] = 1.2096 \times 10^5 \text{ s}$
- d.  $1 \cancel{\text{m}^3} \left[ \frac{264.172 \cancel{\text{gallons}}}{1 \cancel{\text{m}^3}} \right] \left[ \frac{8 \text{ pints}}{1 \cancel{\text{gallon}}} \right] = 2113.38 \text{ pints}$
43.  $\boxed{2\text{nd F}} \boxed{\sqrt{}} \boxed{(} \boxed{3} \boxed{x^2} \boxed{+} \boxed{4} \boxed{x^2} \boxed{)} \boxed{\text{ENTER}} \Rightarrow 5.000$
45.  $\boxed{2\text{nd F}} \boxed{\sqrt{}} \boxed{(} \boxed{4} \boxed{0} \boxed{0} \boxed{\div} \boxed{(} \boxed{6} \boxed{x^2} \boxed{+} \boxed{1} \boxed{0} \boxed{)} \boxed{)} \boxed{\text{ENTER}} \Rightarrow 2.949$

# CHAPTER 1 (Even)

$$4. \quad 50 \frac{\cancel{\text{mi}}}{\cancel{\text{hr}}} \left[ \frac{5280 \text{ ft}}{1 \cancel{\text{mi}}} \right] \left[ \frac{1 \cancel{\text{hr}}}{60 \text{ min}} \right] = 4400 \text{ ft/min}$$

$$d = vt = \left[ \frac{4400 \text{ ft}}{\cancel{\text{min}}} \right] [1 \cancel{\text{min}}] = 4400 \text{ ft}$$

8. MKS

$$10. \quad 1000 \cancel{\text{J}} \left[ \frac{0.7378 \text{ ft-lb}}{1 \cancel{\text{J}}} \right] = 737.8 \text{ ft-lbs}$$

$$12. \quad \text{a. } 10^4 \quad \text{b. } 10^{-4} \quad \text{c. } 10^3 \quad \text{d. } 10^6 \quad \text{e. } 10^{-7} \quad \text{f. } 10^{-5}$$

$$14. \quad \text{a. } 4.2 \times 10^3 + 6,800 \times 10^3 = 6,804.2 \times 10^3 = 6.8042 \times 10^6$$

$$\text{b. } 9 \times 10^4 + 0.36 \times 10^4 = 9.36 \times 10^4$$

$$\text{c. } 50 \times 10^{-5} - 6 \times 10^{-5} = 44 \times 10^{-5} = 4.4 \times 10^{-4}$$

$$\text{d. } 1.2 \times 10^3 + 0.05 \times 10^3 - 0.6 \times 10^3 = 0.65 \times 10^3 = 6.5 \times 10^2$$

$$16. \quad \text{a. } (50 \times 10^3)(3 \times 10^{-4}) = 150 \times 10^{-1} = 1.5 \times 10^1$$

$$\text{b. } (2.2 \times 10^3)(8 \times 10^{-2}) = 17.6 \times 10^1 = 1.76 \times 10^2$$

$$\text{c. } (82 \times 10^{-6})(7 \times 10^{-5}) = 574 \times 10^{-11} = 5.74 \times 10^{-9}$$

$$\text{d. } (30 \times 10^{-4})(2 \times 10^{-4})(7 \times 10^8) = 420 \times 10^0 = 4.2 \times 10^2$$

$$18. \quad \text{a. } \frac{2 \times 10^3}{8 \times 10^{-5}} = 0.25 \times 10^8 = 2.5 \times 10^7$$

$$\text{b. } \frac{4.08 \times 10^{-3}}{60 \times 10^3} = 0.068 \times 10^{-6} = 6.8 \times 10^{-8}$$

$$\text{c. } \frac{2.15 \times 10^{-4}}{5 \times 10^{-5}} = 0.43 \times 10^1 = 4.3 \times 10^0$$

$$\text{d. } \frac{78 \times 10^9}{4 \times 10^{-6}} = 19.5 \times 10^{15} = 1.95 \times 10^{16}$$

$$20. \quad \text{a. } (2.2 \times 10^3)^3 = (2.2)^3 \times (10^3)^3 = 10.65 \times 10^9 = 1.065 \times 10^{10}$$

$$\text{b. } (6 \times 10^{-4} \times 10^2)^4 = (6 \times 10^{-2})^4 = (6)^4 \times (10^{-2})^4 = 1296 \times 10^{-8} = 1.296 \times 10^{-5}$$

$$\text{c. } (4 \times 10^{-3} \times 6 \times 10^2)^2 = (24 \times 10^{-1})^2 = (2.4)^2 = 5.76$$



$$\begin{aligned} \text{d. } ((2 \times 10^{-3})(0.8 \times 10^4)(0.003 \times 10^5))^3 &= (4.8 \times 10^3)^3 = (4.8)^3 \times 10^9 \\ &= 110.6 \times 10^9 = 1.106 \times 10^{11} \end{aligned}$$

$$22. \text{ a. } \frac{(3 \times 10^2)^2(10^2)}{10^4} = \frac{(9 \times 10^4)(10^2)}{10^4} = \frac{9 \times 10^6}{10^4} = 9 \times 10^2 = 900$$

$$\text{b. } \frac{(4 \times 10^4)^2}{(20)^3} = \frac{16 \times 10^8}{8 \times 10^3} = 2 \times 10^5$$

$$\text{c. } \frac{(6 \times 10^4)^2}{(2 \times 10^{-2})^2} = \frac{36 \times 10^8}{4 \times 10^{-4}} = 9 \times 10^{12}$$

$$\text{d. } \frac{(27 \times 10^{-6})^{1/3}}{21 \times 10^4} = \frac{3 \times 10^{-2}}{21 \times 10^4} = \frac{1}{7} \times 10^{-6}$$

$$\text{e. } \frac{[(4 \times 10^3)^2][300]}{2 \times 10^{-2}} = \frac{(16 \times 10^6)(3 \times 10^2)}{2 \times 10^{-2}} = \frac{48 \times 10^8}{2 \times 10^{-2}} = 24 \times 10^{10} = 2.4 \times 10^{11}$$

$$\text{f. } (16 \times 10^{-6})^{1/2}(10^5)^5(2 \times 10^{-2}) = (4 \times 10^{-3})(10^{25})(2 \times 10^{-2}) = 8 \times 10^{20} = 8 \times 10^{20}$$

$$\begin{aligned} \text{g. } \frac{[(3 \times 10^{-3})^3][7 \times 10^{-5}]^2[8 \times 10^2]^2}{[(10^2)(9 \times 10^{-4})]^{1/2}} &= \frac{(27 \times 10^{-9})(49 \times 10^{-10})(64 \times 10^4)}{(9 \times 10^{-2})^{1/2}} \\ &= \frac{84,672 \times 10^{-15}}{3 \times 10^{-1}} \\ &= 28,224 \times 10^{-14} = 2.8224 \times 10^{-10} \end{aligned}$$

$$24. \text{ a. } 2000 \times 10^{-6} \text{ s} \xrightarrow{\text{increase by (3)}} \underline{2.0} \times 10^{-3} \text{ s} = 2 \text{ ms}$$

$$\text{b. } 0.04 \times 10^{-3} \text{ s} \xrightarrow{\text{decrease by (3)}} \underline{40} \times 10^{-6} \text{ s} = 40 \mu\text{s}$$

$$\text{c. } 0.06 \times 10^{-6} \text{ F} \xrightarrow{\text{decrease by (3)}} \underline{60} \times 10^{-9} \text{ F} = 60 \text{ nF}$$

$$\text{d. } 8400 \times 10^{-12} \text{ s} \xrightarrow{\text{increase by (6)}} \underline{0.0084} \times 10^{-6} \text{ s} = 0.0084 \mu\text{s}$$

- e.  $0.006 \times 10^3 \text{ m} = \overset{\text{decrease by (6)}}{\underline{6000}} \times 10^{-3} \text{ m} = 6000 \text{ m}$
- f.  $260 \times \overset{10^0}{\overbrace{10^3 \times 10^{-3}}} \text{ m} \Rightarrow \overset{\text{increase by (3)}}{\underline{0.26}} \times 10^3 \text{ m} = 0.26 \text{ km}$
26. a.  $0.1 \cancel{\mu\text{F}} \left[ \frac{10^{-6} \cancel{\text{F}}}{1 \cancel{\mu\text{F}}} \right] \left[ \frac{1 \text{ pF}}{10^{-12} \cancel{\text{F}}} \right] = 0.1 \times 10^{-6} \times 10^{12} \text{ pF} = 10^5 \text{ pF}$
- b.  $0.467 \cancel{\text{km}} \left[ \frac{10^3 \text{ m}}{1 \cancel{\text{km}}} \right] = 467 \text{ m}$
- c.  $63.9 \times 10^{-3} \cancel{\text{m}} \left[ \frac{100 \text{ cm}}{1 \cancel{\text{m}}} \right] = 63.9 \times 10^{-1} \text{ cm} = 6.39 \text{ cm}$
- d.  $69 \cancel{\text{cm}} \left[ \frac{1 \cancel{\text{m}}}{100 \cancel{\text{cm}}} \right] \left[ \frac{1 \text{ km}}{1000 \cancel{\text{m}}} \right] = 69 \times 10^{-5} \text{ km}$
- e.  $3.2 \cancel{\text{h}} \left[ \frac{60 \cancel{\text{min}}}{1 \cancel{\text{h}}} \right] \left[ \frac{60 \cancel{\text{s}}}{1 \cancel{\text{min}}} \right] \left[ \frac{1 \text{ ms}}{10^{-3} \cancel{\text{s}}} \right] = 11.52 \times 10^6 \text{ ms}$
- f.  $0.016 \cancel{\text{mm}} \left[ \frac{10^{-3} \cancel{\text{m}}}{1 \cancel{\text{mm}}} \right] \left[ \frac{1 \mu\text{m}}{10^{-6} \cancel{\text{m}}} \right] = 0.016 \times 10^3 \mu\text{m} = 16 \mu\text{m}$
- g.  $60 \text{ cm}^2 = 60(\cancel{\text{cm}})(\cancel{\text{cm}}) \left[ \frac{1 \text{ m}}{100 \cancel{\text{cm}}} \right] \left[ \frac{1 \text{ m}}{100 \cancel{\text{cm}}} \right] = 60 \times 10^{-4} \text{ m}^2$
28.  $5280 \text{ ft}, 5280 \cancel{\text{ft}} \left[ \frac{1 \text{ yd}}{3 \cancel{\text{ft}}} \right] = 1760 \text{ yds}$
- $5280 \cancel{\text{ft}} \left[ \frac{12 \cancel{\text{in.}}}{1 \cancel{\text{ft}}} \right] \left[ \frac{1 \text{ m}}{39.37 \cancel{\text{in.}}} \right] = 1609.35 \text{ m}, 1.61 \text{ km}$
30.  $\frac{50 \cancel{\text{ft}}}{20 \cancel{\text{s}}} \left[ \frac{1 \text{ mi}}{5280 \cancel{\text{ft}}} \right] \left[ \frac{60 \cancel{\text{s}}}{1 \cancel{\text{min}}} \right] \left[ \frac{60 \cancel{\text{min}}}{1 \text{ h}} \right] = 1.7 \text{ mph}$
32.  $\frac{6 \cancel{\text{mi}}}{\cancel{\text{h}}} \left[ \frac{5280 \cancel{\text{ft}}}{1 \cancel{\text{mi}}} \right] \left[ \frac{12 \cancel{\text{in.}}}{1 \cancel{\text{ft}}} \right] \left[ \frac{1 \text{ m}}{39.37 \cancel{\text{in.}}} \right] \left[ \frac{1 \cancel{\text{h}}}{60 \cancel{\text{min}}} \right] \left[ \frac{1 \cancel{\text{min}}}{60 \text{ s}} \right] = 2.682 \text{ m/s}$

$$34. \quad 10 \cancel{\text{km}} \left[ \frac{1000 \cancel{\text{m}}}{1 \cancel{\text{km}}} \right] \left[ \frac{39.37 \cancel{\text{in.}}}{1 \cancel{\text{m}}} \right] \left[ \frac{1 \cancel{\text{ft}}}{12 \cancel{\text{in.}}} \right] \left[ \frac{1 \text{ mi}}{5280 \cancel{\text{ft}}} \right] = 6.214 \text{ mi}$$

$$v = \frac{1 \text{ mi}}{6.5 \text{ min}}, \quad t = \frac{d}{v} = \frac{6.214 \cancel{\text{mi}}}{\frac{1 \cancel{\text{mi}}}{6.5 \text{ min}}} = 40.39 \text{ min}$$

$$36. \quad 55 \text{ mph: } t = \frac{d}{v} = \frac{3000 \cancel{\text{mi}}}{\frac{55 \cancel{\text{mi}}}{\text{h}}} = 54.55 \text{ h}$$

$$65 \text{ mph: } t = \frac{d}{v} = \frac{3000 \cancel{\text{mi}}}{\frac{65 \cancel{\text{mi}}}{\text{h}}} = 46.15 \text{ h}$$

$$38. \quad d = 86 \cancel{\text{stories}} \left[ \frac{14 \cancel{\text{ft}}}{\cancel{\text{story}}} \right] \left[ \frac{1 \text{ step}}{\frac{9}{12} \cancel{\text{ft}}} \right] = 1605 \text{ steps}$$

$$v = \frac{d}{t} \Rightarrow t = \frac{d}{v} = \frac{1605 \text{ steps}}{\frac{2 \text{ steps}}{\text{second}}} = 802.5 \cancel{\text{seconds}} \left[ \frac{1 \text{ minute}}{60 \cancel{\text{seconds}}} \right] = 13.38 \text{ minutes}$$

$$40. \quad \frac{5 \text{ min}}{\text{mile}} \Rightarrow \frac{1 \cancel{\text{mile}}}{5 \text{ min}} \left[ \frac{5,280 \text{ ft}}{1 \cancel{\text{mile}}} \right] = \frac{1056 \text{ ft}}{\text{minute}}, \text{ distance} = 86 \cancel{\text{stories}} \left[ \frac{14 \text{ ft}}{\cancel{\text{story}}} \right] = 1204 \text{ ft}$$

$$v = \frac{d}{t} \Rightarrow t = \frac{d}{v} = \frac{1204 \text{ ft}}{\frac{1056 \text{ ft}}{\text{min}}} = 1.14 \text{ minutes}$$

$$42. \quad \boxed{6} \boxed{\times} \boxed{(} \boxed{4} \boxed{+} \boxed{8} \boxed{)} \boxed{\text{ENTER}} \Rightarrow 72.000$$

$$44. \quad \boxed{2\text{nd}} \boxed{\tan^{-1}} \boxed{(} \boxed{4} \boxed{\div} \boxed{3} \boxed{)} \boxed{\text{ENTER}} \Rightarrow 53.13$$